We claim:

1. A discharge lamp comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a metal halide, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

said lamp having a molybdenum coil wrapped around the discharge vessel and at least a portion of the electrode feed through means, and having a power range of about 150W to about 1000W and exhibiting one or more of a characteristic selected from the group consisting of a CCT (correlated color temperature) of about 3800 to about 4500K, a CRI (color rendering index) of about 70 to about 95, a MPCD (mean perceptible color difference) of about ±10, and a luminous efficacy up to about 85-95 lumens/watt.

2. A lamp as claimed in Claim 1 retrofit with ballasts designed for high pressure sodium or quartz metal halide lamps.

3. A discharge lamp having a power range of about 150W to about 1000W and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said

discharge space an ionizable material comprising a metal halide, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

wherein the ceramic discharge vessel includes an arc tube comprising:

a cylindrical barrel having a central axis and a pair of opposed end walls,

a pair of ceramic end plugs extending from respective end walls along said axis,

a pair of lead-ins extending through respective end plugs, said lead-ins being connected to respective electrodes which are spaced apart in said central barrel,

wherein the electrode feedthrough means each have a lead-in of niobium which is hermetically sealed into the arc tube, a central portion of molybdenum/aluminum cermet, a molybdenum rod portion and a tungsten tip having a winding of tungsten, and wherein said lamp has a molybdenum coil attached to the arc tube and at least a portion of the ceramic end plugs.

4. A lamp as claimed in Claim 3, wherein the arc tube has a molybdenum coil wrapped around a substantial portion and around at least a portion of the ceramic end plugs.

5. A lamp as claimed in Claim 4, wherein the discharge space contains an ionizable filling of an inert gas, a metal halide, and mercury.

6. A lamp as claimed in Claim 5 wherein, said discharge vessel has a ceramic wall and is closed by a ceramic plug, said electrode feedthrough means including at least one tungsten electrode which is connected to a niobium electric current conductor by means of a leadthrough element which projects into the ceramic plug with a tight fit, is connected thereto in a gastight manner by means of a sealing ceramic and has a part formed from aluminum and molybdenum which forms a cermet at the area of the gastight connection.

7. A lamp as claimed in Claim 5, wherein , said discharge vessel has a ceramic wall and is closed by a ceramic plug, said electrode feedthrough means including at least one tungsten electrode which is connected to a niobium electric current conductor by means of a leadthrough element which projects into the ceramic plug with a tight fit, is connected thereto in a gastight manner by means of a sealing ceramic and has a first part formed from aluminum and molybdenum which forms a cermet at the area of the gastight connection and a second part which is a metal part and extends from the cermet in the direction of the

electrode.

8. A lamp as claimed in Claim 7, wherein the metal part is a molybdenum rod.

9. A lamp as claimed in Claim 5, wherein the arc tube has an aspect ratio (IL/ID) in the range of about 3.3 to about 6.2.

10. A lamp as claimed in Claims 6 and 7, wherein the electrode has a tip extension in the range of about 0.2 to about 0.5mm; the cermet contains at least about 35 wt.% Mo with the remainder being $Al_2O_3$, and the as sealing ceramic flow completely covers the Nb connector.

11. A lamp as claimed in Claim 10, wherein the arc tube and the electrode feedthrough means have the following characteristics for a given lamp power:

| Power W | IL mm | ID mm | IL/ID aspect ratio,mm | Wall Loading W/cm$^2$ | Wall Thickness mm | Rod Diameter mm | Rod Length mm |
|---|---|---|---|---|---|---|---|
| 150 | 26-32 | 5-7 | 3.3-6.2 | 20-35 | 0.8-1.1 | 0.4-0.6 | 3-6 |
| 200 | 27-32 | 6.5-7.5 | 3.3-6.2 | 25-30 | 0.85-1.2 | 0.4-0.6 | 4-8 |
| 250 | 28-34 | 7.5-8.5 | 3.3-6.2 | 25-35 | 0.9-1.3 | 0.7-1.0 | 6-10 |
| 300 | 30-36 | 8-9 | 3.3-6.2 | 25-37 | 0.92-1.4 | 0.7-1.0 | 6-10 |
| 350 | 33-40 | 8.5-10 | 3.3-6.2 | 24-40 | 0.98-1.48 | 0.7-1.1 | 6-11 |
| 400 | 36-45 | 8.5-11 | 3.3-6.2 | 22-40 | 1.0-1.5 | 0.7-1.1 | 6-11 |

12. A lamp as claimed in Claim 11, wherein said metal halide comprises the following salts of 6-25 wt% NaI, 5-6 wt% TlI, 34-37 wt% $CaI_2$, 11-18 wt% $DyI_3$, 11-18 wt% $HoI_3$, and 11-18 wt% $TmI_3$.

13. A lamp as claimed in Claim 12, wherein the ionizable filling is a mixture of about 99.99% of Xenon and a trace amount of Kr-85 radioactive gas.

14. A lamp as claimed in Claim 12, wherein the ionizable filling is a one or more rare gases, such as Neon, Argon, Krypton and Xenon.

15. A lamp as claimed in Claim 12, wherein the ionizable filling is Xenon.

16. A lamp as claimed in Claim 1, 5, and 13, having a power range of about 150W to about 1000W and 100V to 263V, and one or more of the following characteristics: a lumen maintenance of >80%, a color temperature shift <200K from 100 to 10,000 hours, and lifetime of about 10,000 to about 25,000 hours.

17. A design space of parameters for the design and construction of a discharge lamp comprising a discharge vessel, having a molybdenum coil wrapped around the discharge vessel and at least a portion of the electrode feed through means, and having a power range of about 150W to about 1000W and comprising a ceramic discharge vessel enclosing a discharge space, said discharge

vessel including within said discharge space an ionizable material comprising a metal halide, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

said design space including at least one of the following parameters :

(i) the arc tube length, diameter and wall thickness limits of said discharge lamp correlated to and expressed as functions of lamp power, and/or color temperature, and/or lamp voltage; and

(ii) the electrode feedthrough structure limits used to conduct electrical currents with minimized thermal stress on the arc tube correlated to and expressed as a function of lamp current.

18. A design space as claimed in Claim 17, wherein said parameters also include :

(i) a general aspect ratio of the inner length (IL) to the inner diameter (ID) of the arc tube body is higher than that of ceramic metal halide lamps having a power of less than about 150W;

(ii) the upper and lower limits of electrode rod diameter correlated to and expressed as a function of lamp current; and

(iii) a composition range of the salts correlated to and expressed as a function of color temperature and lamp voltage.

19. A design space as claimed in Claim 18, wherein said design parameters include the following characteristics for the design of an arc tube and electrode feedthrough means for a given lamp power:

| Power W | IL mm | ID mm | IL/ID aspect ratio,mm | Wall Loading W/cm$^2$ | Wall Thickness mm | Rod Diameter mm | Rod Length mm |
|---|---|---|---|---|---|---|---|
| 150 | 26-32 | 5-7 | 3.3-6.2 | 20-35 | 0.8-1.1 | 0.4-0.6 | 3-6 |
| 200 | 27-32 | 6.5-7.5 | 3.3-6.2 | 25-30 | 0.85-1.2 | 0.4-0.6 | 4-8 |
| 250 | 28-34 | 7.5-8.5 | 3.3-6.2 | 25-35 | 0.9-1.3 | 0.7-1.0 | 6-10 |
| 300 | 30-36 | 8-9 | 3.3-6.2 | 25-37 | 0.92-1.4 | 0.7-1.0 | 6-10 |
| 350 | 33-40 | 8.5-10 | 3.3-6.2 | 24-40 | 0.98-1.48 | 0.7-1.1 | 6-11 |
| 400 | 36-45 | 8.5-11 | 3.3-6.2 | 22-40 | 1.0-1.5 | 0.7-1.1 | 6-11 |

20. A method for the design and construction of a discharge lamp having a molybdenum coil wrapped around the discharge vessel and at least a portion of the electrode feed through means, and having a power range of about 150W to about 1000W and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a metal halide, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

which method comprises the steps of determining the dimensions of the arc tube of the discharge vessel and the electrode feedthrough means structure using a design space of Claim 17.

21 ~~22~~. A method for the design and construction of a discharge lamp

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having a a molybdenum coil wrapped around the discharge vessel and at least a portion of the electrode feed through means, and having power range of about 150W to about 1000W and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a metal halide, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

which method comprises the steps of determining the dimensions of the arc tube of the discharge vessel and the electrode feedthrough means structure using a design space of Claim 18.

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~~23~~. A method for the design and construction of a discharge lamp having a molybdenum coil wrapped around the discharge vessel and at least a portion of the electrode feed through means, and having a power range of about 150W to about 1000W and comprising a ceramic discharge vessel enclosing a discharge space, said discharge vessel including within said discharge space an ionizable material comprising a metal halide, a first and second discharge electrode feedthrough means, and a first and second current conductor connected to said first and second discharge electrode feedthrough means, respectively;

which method comprises the steps of determining the dimensions of the arc tube of the discharge vessel and the electrode feedthrough means structure using a design space of Claim 19.

23 ~~24~~. A method as claimed in Claim 23, including the further design parameter that the metal halide comprises the following salts of 6-25 wt% NaI, 5-6 wt% TlI, 34-37 wt% $CaI_2$, 11-18 wt% $DyI_3$, 11-18 wt% $HoI_3$, and 11-18 wt% $TmI_3$.

24 ~~25~~. A method as claimed in Claim 24, including the further design parameter that the ionizable filling is a mixture of about 99.99% of Xenon and a trace amount of Kr-85 radioactive gas.

25 ~~26~~. A method as claimed in Claim ~~25~~, including the further design parameter that the discharge vessel has a ceramic wall and is closed by a ceramic plug, said electrode feedthrough means including at least one tungsten electrode which is connected to a niobium electric current conductor by means of a leadthrough element which projects into the ceramic plug with a tight fit, is connected thereto in a gastight manner by means of a sealing ceramic and has a part formed from aluminum and molybdenum which forms a cermet at the area of the gastight connection.

26 ~~27.~~ A method as claimed in Claim ~~25~~, including the further design parameter that the discharge vessel has a ceramic wall and is closed by a ceramic plug, said electrode feedthrough means including at least one tungsten electrode which is connected to a niobium electric current conductor by means of a leadthrough element which projects into the ceramic plug with a tight fit, is connected thereto in a gastight manner by means of a sealing

ceramic and has a first part formed from aluminum and molybdenum which forms a cermet at the area of the gastight connection and a second part which is a metal part and extends from the cermet in the direction of the electrode.

~~28~~ 27. A method as as claimed in Claim 27, wherein the metal part is a molybdenum rod.

~~29~~ 28. A method as claimed in Claims 26 and 27, wherein the electrode has a tip extension in the range of about 0.2 to about 0.5mm; the cermet contains at least about 35 wt.% Mo with the remainder being $Al_2O_3$, and the as sealing ceramic flow completely covers the Nb connector.

~~30~~ 29. A method as claimed in Claims 20 wherein the lamp produced has a power range of about 150W to about 1000W and 100V to 263V, and one or more of the following characteristics: a lumen maintenance of >80%, a color temperature shift <200K from 100 to 10,000 hours, and lifetime of about 10,000 to about 25,000 hours.

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